

Notes on the Behaviour of Rajah Brooke's Birdwing  
Butterfly, *Trogonoptera brookiana brookiana*  
(Wallace), in Sarawak

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Rajah Brooke's birdwing was first described by Alfred Russell Wallace (1855) from male specimens from the island of Borneo, but the habits of the nominate race *T. b. brookiana* (Wallace) are rather less well known than those of *T. b. albescens* Rothschild from the central States of the Malay Peninsula (Wheeler 1940, Corbet & Pendlebury 1956). For a period of six weeks during the summer of 1978 I had the good fortune to be able to observe the behaviour of this species on the island of Borneo, as a member of the Royal Geographical Society/Sarawak Government Mulu Expedition.

The Base Camp of the Mulu Expedition was situated near the boundary of the Gunong Mulu National Park, Sarawak, Malaysia. A number of the subcamps had also been established by the expedition within the park, notably marking the ascent of Gunong Mulu (2376m.) the highest peak (Camps 1-4), and on the Sungai (River) Melinau (Camp 5), on which the base camp was also situated. Most observations on *T. brookiana* were made during the period 15th July to 7th August at Base Camp, and from 16th August to 24th August at Camp 5.

The National Park is situated in northern Sarawak near the Brunei border (Sarawak 4th and 5th Divisions) in primary rain forest. The Base Camp, built in the form of a Malaysian ("dayak") long house with several out-buildings for visitors and local workers on the expedition, was situated in a small clearing bordering the north bank of the river Melinau at Long Pala (map reference K322-448: sheet 4/114/16-D.O.S. 434 (series T735) Malaysia) at an estimated altitude of 65m. A helipad had been cleared and a small laboratory erected on the opposite bank. Most of the surrounding forest was of the alluvial type characteristic of a considerable part of the lowland area of the park (Hanbury-Tenison & Jermy, 1979) but there were high limestone outcrops ("batus") adjacent to the Base Camp clearings on both sides of the river. Males of *T. brookiana* were constantly seen around the long house and several females were also seen in the Base Camp area.

Males were seen on almost every sunny day and could be encountered from mid-morning until about 4.30 p.m., but were most commonly seen near noon. They were particularly attracted by a drainage ditch which ran along the back and east side of the house and by a deep pit sunk into the alluvium at some distance from the house, later used for the burial of rubbish. In both cases they were often to be seen feeding on moist areas of mud beside or within the excavations, but not usually from actual puddles. The approach of a single male was usually by swift direct flight at about a metre from

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the ground, at least within the clearing. The male flight is characteristic, with the costal margins of the forewings extended directly laterally forming a straight line, and with rapid but shallow wing-beats giving a very bird-like appearance. While the flight is rapid and very swiftlike there seems little ability to manoeuvre and males are easily caught with a large net. When feeding at seepages they flutter at first or if apprehensive, but then settle with wings stationary and horizontal in the flight posture. Added flavour at the seepage was obviously also an attraction and an area on the course of the ditch which received used washing-up water was very popular, as was a rich muddy area at the opposite end of the house. At Camp 5 a urine patch was established in sand a little way away from the river's edge, which proved very attractive to several species of *Graphium* (Papilionidae), drinking there at 4.00 p.m. on 23rd August.

At Base Camp one sometimes saw several males together and there seemed to be mutual attraction and interaction between them so that one specimen feeding would attract one or two others. However, it seems probable that all were "visitors" to the long house in the sense that the feeding places were not part of any individual's territory. At Camp 5, on the other hand, two distinct types of apparently territorial behaviour of the type referred to by D'Abbrera, Doggett and Parker (1976) were observed.

The clearing in which the Camp 5 building was situated (map reference K427-565 estimated altitude 150m.) was bounded on the north side by the Melinau river, on the east and west sides by alluvial forest, and on the south side, parallel to and opposite the river, by a high limestone cliff face with a shallow rock shelter at its base. This had a sandy floor which extended a few feet into the clearing and was extensively pitted by nests of the digger wasp, *Sphex subtruncatus* Dahlbom 1843 (I am grateful to Mr. M. C. Day of the British Museum (Natural History) for this identification). A solitary male *T. brookiana* was to be seen there on most days patrolling up and down the length of the rock shelter, parallel to the bottom of the cliff face, seldom settling and never drinking: there were no patches of moisture along its beat. On sunny mornings it was to be seen as early as 9.30 a.m. and then intermittently throughout the day, often continuing as late as 4.30 or 5.00 p.m., when there was no longer any direct sunlight on its beat.

The second type of territorial behaviour was seen at two similar locations. Near Camp 5 there were a number of solitary specimens of the small tree *Ixora javanica* in flower. It bears bright orange globular inflorescences which are very attractive to papilionid butterflies, notably, at Camp 5, *P. memnon*, *P. helenus*, *P. nephelus*, *P. fuscus*, as well as *T. brookiana*. At both locations an *Ixora* bush stood at the edge of a dry river bed, each separate river bed forming a flood

channel for the Melinau river. The *Ixora* in each case formed part of the margin of the forest and was thus flanked by much taller forest trees: each *Ixora* appeared to form the focus of the territory of a single male *T. brookiana*. The male had a nesting station on a particular leaf of a particular branch on each of the two trees immediately flanking the *Ixora*. At the first location, where the river bed was wider and far more open with the *Ixora* on the well-defined east facing bank, the leaf stations were at a height of about 2.5m.: at the second more enclosed site facing southwards they were at about 2.0m. The male in each case would leave one of its stations to patrol its beat along the dry river for several hundred metres (the precise span of the territory could not be observed) or to visit the "home" *Ixora* blooms to feed. This behaviour was seen at various times of day, from about 11.00 a.m. until about 4.00 p.m., but the earliest and latest times at which it occurred are not known.

As with many tropical rain forest butterfly species, the relative scarcity of female *T. brookiana* has been remarked on by several authors (Wheeler 1940, Corbet & Pendlebury 1956). Several females were seen by me at Mulu and I was able to see something of their interaction with the males. *T. brookiana* does not have such marked sexual dimorphism as birdwings of the genus *Ornithoptera*, but the white patches near the apex of the forewing were very conspicuous in flight in the Mulu females, as Wheeler notes for *T. b. albescens*. The mode of flight of the female is also very different from that of the male, with a much greater excursion of the wings at each beat, and gives an impression of great power and directness.

At Base Camp females were seen on three occasions in similar circumstances. That on the 23rd July at about 11.00 a.m. was typical. A female was first seen emerging from the edge of the forest into the base camp clearing from the west at a height of perhaps 12m. It flew down a remarkably straight flight path at an angle of about 20°-30° to the horizontal, but turned away and was lost to view before coming near to the house. On this occasion a single male was seen near the house when the female was spotted: immediately after she disappeared four males were seen together in an apparently agitated state. There was no way to establish that their appearance had any connection with that of the female, but in the light of later observations (below) it seems not improbable.

Actual courtship behaviour was seen at the second Camp 5 territorial station noted above. The male occupant of this station was a very worn and thus presumably old specimen: all other males seen at close quarters in Sarawak looked remarkably fresh. At about 2.00 p.m. on Tuesday 22nd August I was observing this male from a distance of about 3m. It was feeding on the *Ixora* flowers, moving from one inflorescence to another, when a female suddenly appeared

hovering immediately above, having presumably flown down from the canopy above and behind. At first the male attempted to continue feeding, adopting a stationary but hovering posture. The female, however, moved up and down at a maximum height of about 30 cm. above him, coming down to buffet him from above and then rising again rhythmically. Both hovered with outspread wings throughout. The male soon abandoned any further attempt to feed, but was very much the passive and apparently reluctant partner in the courtship throughout.

As I knew of no published account of breeding and rearing *T. brookiana brookiana* (the early stages of *T. brookiana trogon* from Sumatra were described by Straatman and Nieuwenhuis: 1961) I caught both specimens at this point to attempt hand-pairing. Both were taken back to the Camp 5 building at about 4.30 and after half an hour in a hanging cylindrical net pairing cage (diameter 34 cm., height 40 cm.) hand-pairing was attempted using the technique described by Clarke and Sheppard (1956). This was unsuccessful: the male was easily induced to open its claspers and to clasp the female, but a firm engagement of the genitalia was not achieved.

After the attempt the male was fed on sugar solution on cotton wool in a petri dish, in the open on a sunlit ledge. It fed for ten minutes with wings horizontal and motionless and was easily returned to the cage with the female. In the cage, however, the male was active, but the female totally passive, unless buffeted by the male, until dusk. On the following morning, 23rd August, both male and female were fed at about 8.00 a.m., the male outside as before, the female within the cage. She fed motionless, wings raised to a mutual angle of about 130°. She was later observed resting with the wings partially or completely raised and closed over the back in typical butterfly pose, an attitude never seen by me in any male of *T. brookiana*. At 8.30 hand pairing was again attempted, unsuccessfully and the male released (Mr. Bernard D'Abrera has subsequently told me that all attempts, known to him, to hand-pair *T. brookiana* have failed). The female then remained quiescent in the cage in full sunlight until nearly 11.00 a.m. when she fluttered again, but was quiet for most of the day until fed in the evening. On Thursday 24th August she was taken back, still alive and in perfect condition, to Base Camp and (inadvertantly) released at the long house, whereupon she flew directly and at great speed across the river and to the forest canopy.

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APPARENT COLOUR SELECTIVITY BY PARARGE AEGERIA L. WHEN FEEDING AT FLOWERS. — This butterfly is seen feeding at flowers in Britain only infrequently. In late August and September 1967, and in the four succeeding years, I saw it feeding at flowers of copper-coloured single chrysanthemums in my garden at Dartford, yet never at those of other colours (red, pink and yellow), nor at flowers of *Buddleia davidii* *Sedum spectabile* (pink), *Lychnis coronaria* (pink), Michaelmas daisies (*Aster* sp. blue) and single dahlias of various colours popular with other species of butterflies. The chrysanthemums deteriorated, despite propagation annually by cuttings, and were discontinued.

On September 8th 1979, a specimen of *P. aegeria* was noticed feeding at the golden flowers with a brown centre of a cultivar of *Rudeckia speciosa* in my garden, and again on five subsequent days, although perhaps the same specimen appeared on all or some of these occasions. Each time the butterfly made occasional moves from one clump to another paying no attention to other flowers popular with other butterflies, and these included those mentioned above with the addition of *Inula hookeri* (yellow), sweet wivelsfield (*Dianthus* hybrid — pink and red) and a hedge of *Lathyrus latifolius* (pink).

However, records show that elsewhere *P. egeria* has been observed feeding at flowers of other colours, e.g. blackthorn, bramble and buddleia, although the first two examples would refer to earlier broods. — B. K. WEST, 36 Briar Road, Bexley, Kent.

CNAEMIDOPHORUS RHODODACTYLA (DENIS & SCHIFF.) IN HAMPSHIRE. — On 15th July 1977 I disturbed a single specimen of this distinctive moth in Botley Wood, South Hampshire. The moth may, perhaps, be overlooked in other localities because of its secretive nature; this specimen made no attempt to fly when its rose-bush was tapped but dropped straight to the ground, and was only noticed because it fell on a patch of bare earth. There seem to be no previous Hampshire records of this species: Goater in "Butterflies and Moths of Hampshire and the Isle of Wight" includes it in square brackets with the comment that it was given by Fassnidge as a doubtful record. — J. D. CHADD, College of the Resurrection, Mirfield, West Yorkshire.